

S. C. BOND.  
METHOD OF SEALING AND CAPPING BOTTLES.  
APPLICATION FILED FEB. 3, 1908.

899,004.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.

FIG. 1.

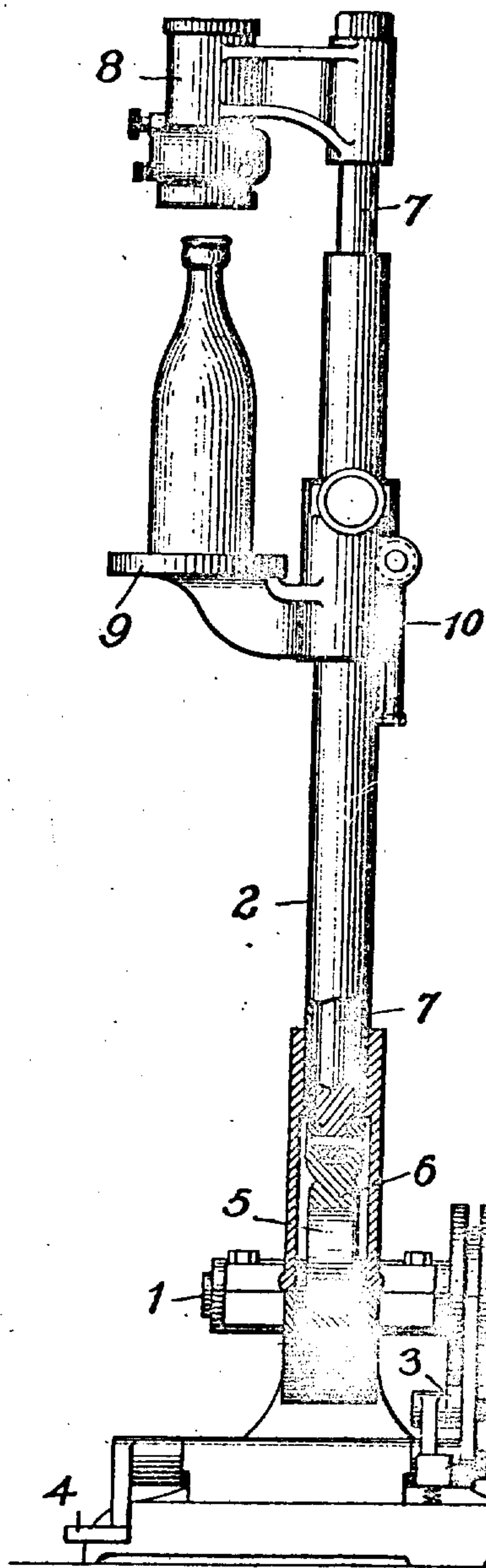


FIG. 2.

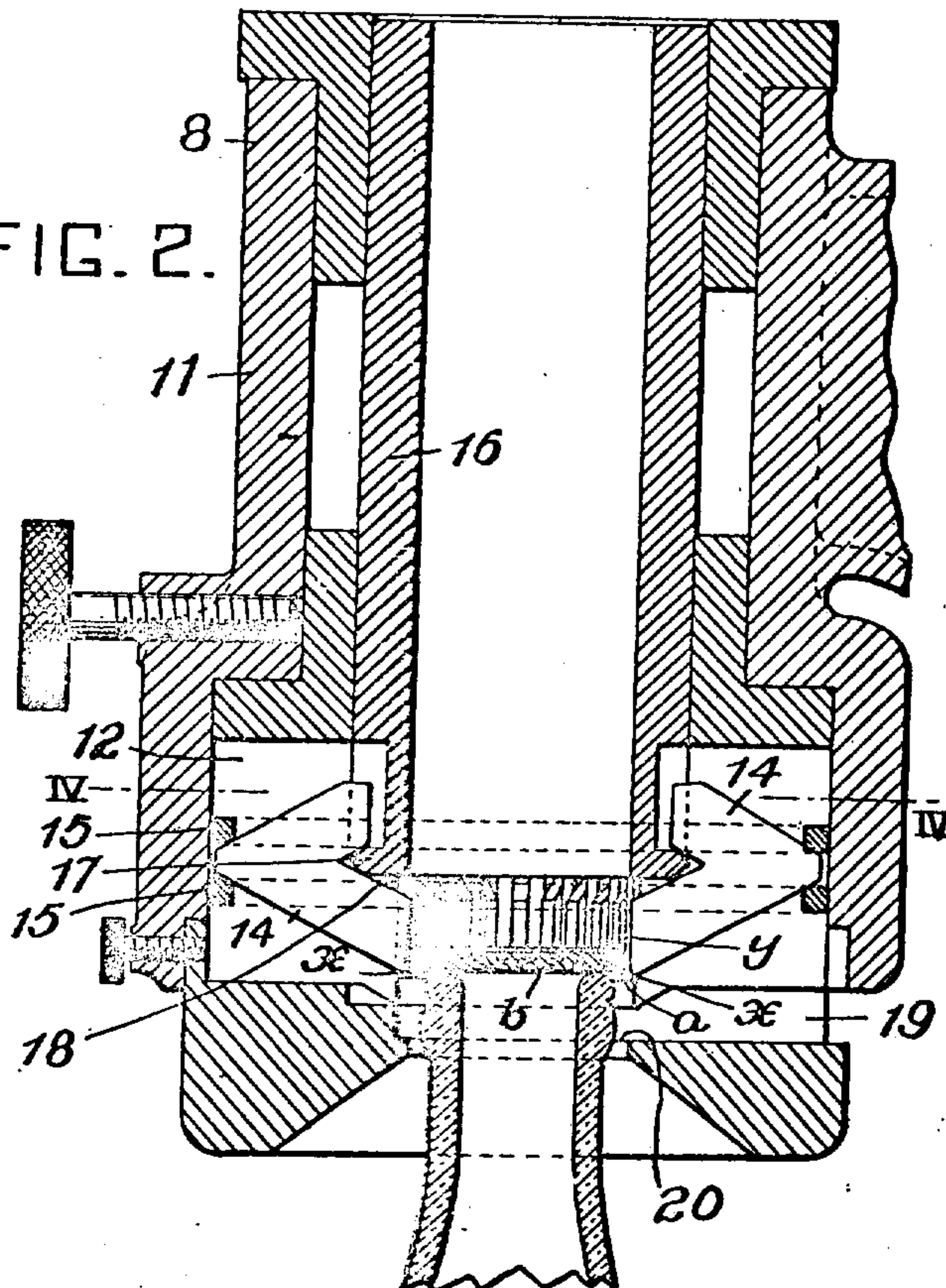
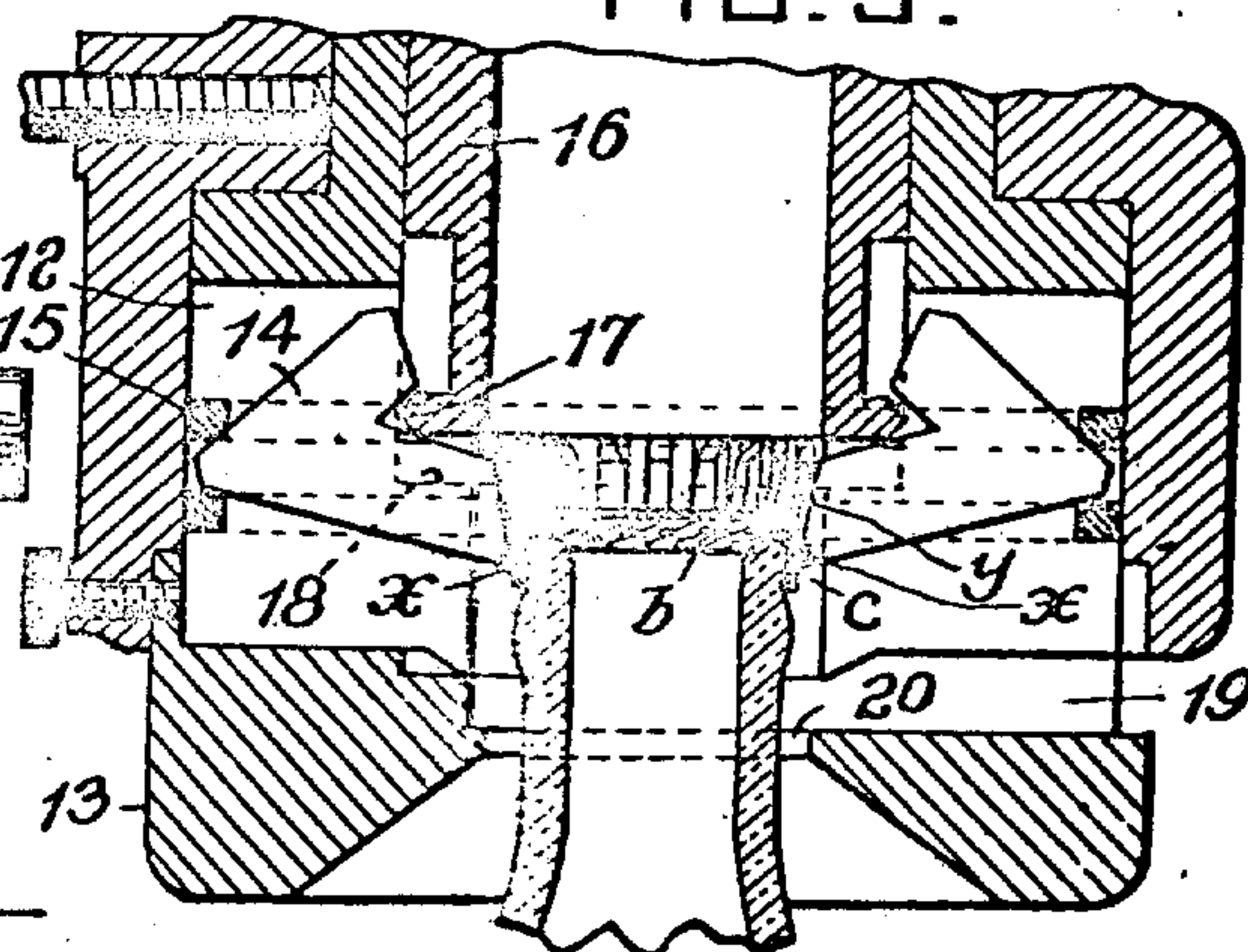


FIG. 3.



WITNESSES:

J. Herbert Bradley.  
Francis Tomasson.

INVENTOR

Samuel C. Bond,  
by Christy & Christy, Attys.

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2 SHEETS—SHEET 2.

FIG. 4.

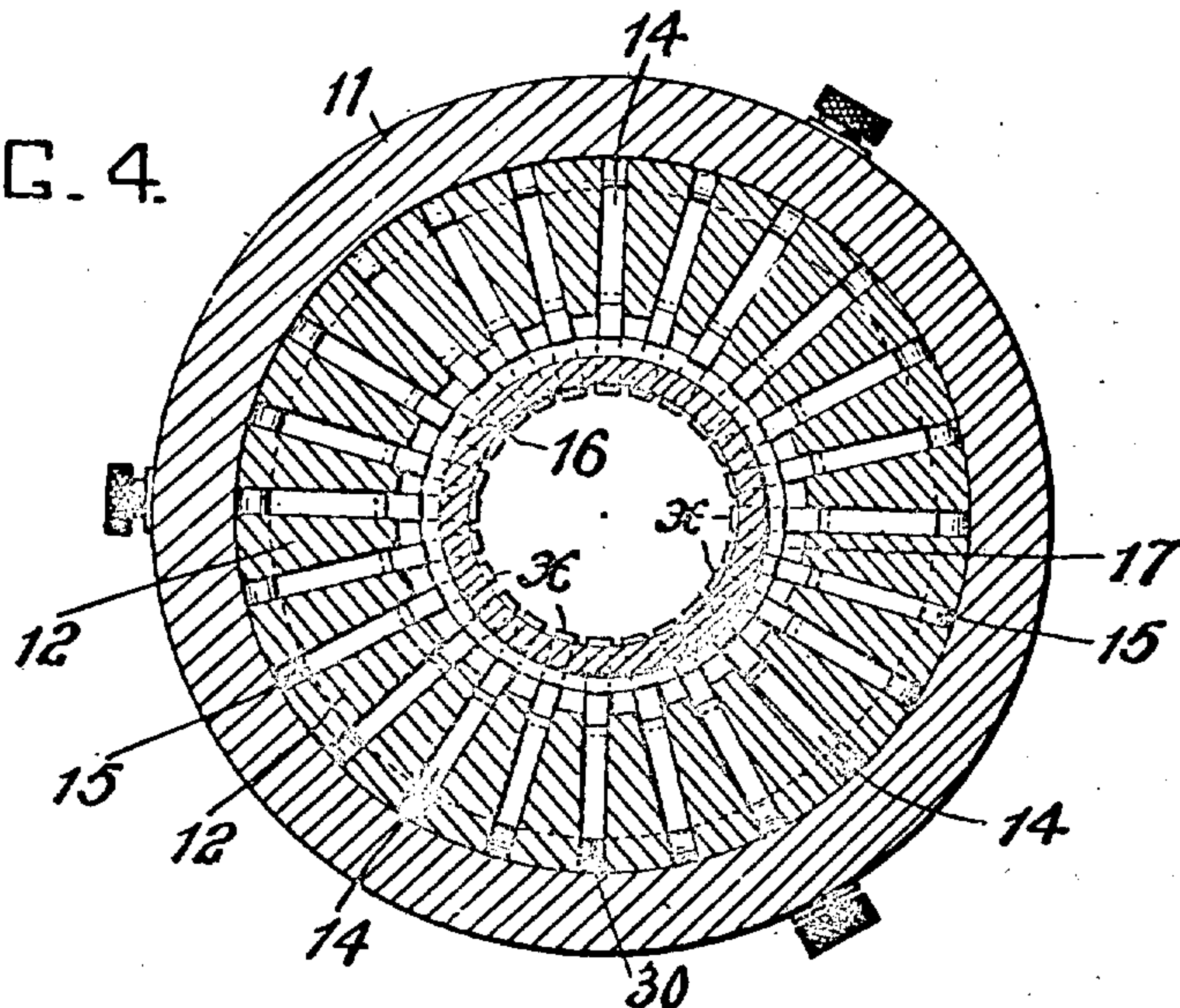


FIG. 5.

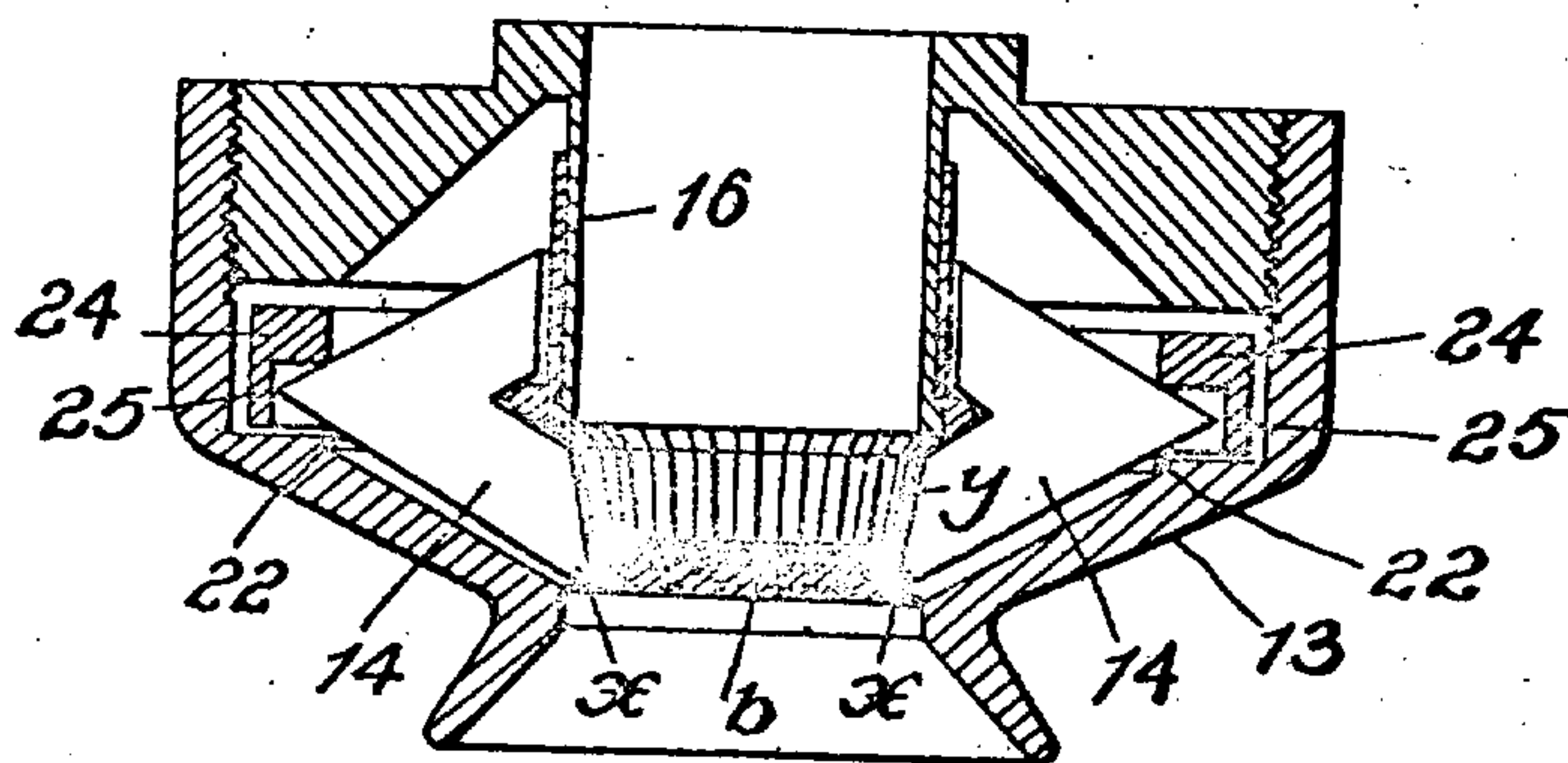
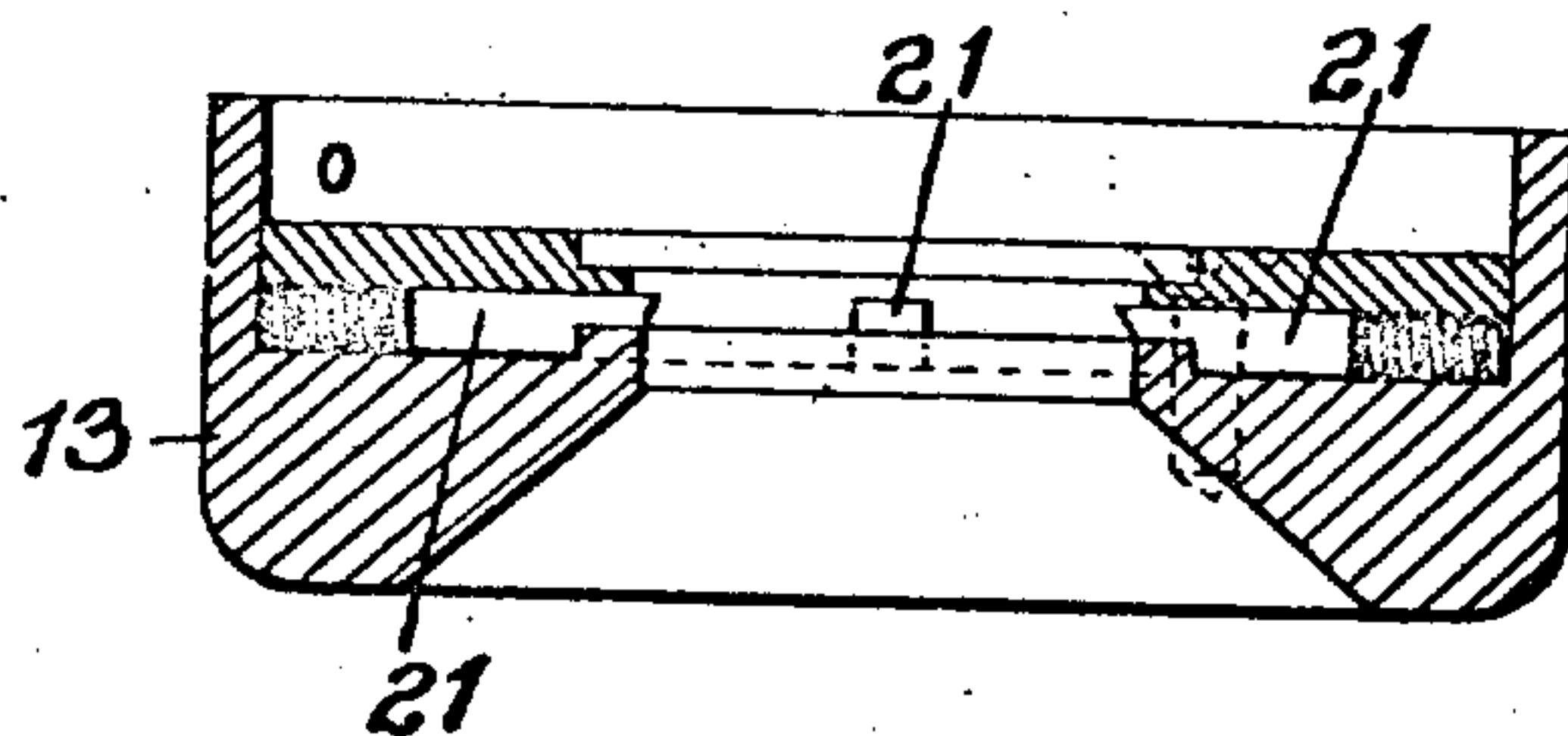


FIG. 6.



WITNESSES:

J. Herbert Bradley.  
Francis Tomason.

INVENTOR

Samuel C. Bond,  
by Christy & Christy, Attys.



# UNITED STATES PATENT OFFICE.

SAMUEL C. BOND, OF WILMINGTON, DELAWARE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
BOND BOTTLE SEALING COMPANY, A CORPORATION OF DELAWARE.

## METHOD OF SEALING AND CAPPING BOTTLES.

No. 899,004.

Specification of Letters Patent.

Patented Sept. 15, 1908.

Original application filed October 11, 1907, Serial No. 396,988. Divided and this application filed February 3, 1908.  
Serial No. 414,065.

*To all whom it may concern:*

Be it known that I, SAMUEL C. BOND, residing at Wilmington, in the county of Newcastle and State of Delaware, a citizen of the United States, have invented or discovered certain new and useful Improvements in Methods of Sealing and Capping Bottles, of which improvements the following is a specification.

10 The invention is particularly applicable to the sealing of bottles, jars, etc. by means of a sealing medium contained in a metallic cap, the latter being provided with a depending flange or fingers which are caused to engage an exterior bead or other suitable projection or projections at or near the lip of the bottle, and thereby hold the sealing medium firmly upon the bottle-mouth.

15 In the methods now commonly practiced of applying this class of seals to bottles, the first step consists in applying pressure upon the top of the cap, so as to compress the sealing medium tightly upon the lip of the bottle; then, while the cap and the bottle are subjected to this sealing pressure, which where the confined contents of the bottle will generate a high pressure, must be considerable, the instrumentalities for locking the cap-flange to the bottle are brought into operation, and additional pressure is thereby brought to bear upon the neck of the bottle. These combined pressures frequently break the bottle. Further, as bottles of any class or capacity vary considerably in height, it has been necessary to so construct prior bottle-sealing machines that they will be capable of exercising the necessary sealing pressure upon the shortest bottle. This has rendered necessary the employment of springs or other compensating devices, in order to prevent the application to a longer bottle of such an excess of pressure as will break it. Such compensating devices not only increase the complexity and cost of the machine, but they are difficult of accurate adjustment, and therefore often fail to perform their intended function. Also in many cases where the bottle is not actually broken, there has been an excess of pressure sufficient to cause the lip of the bottle to fracture the sealing disk, which often results in an imperfect seal. In some prior machines, also, the instrumentalities employed for locking

the cap-flange to the bottle are operated or controlled by the seal-compressing means, so that an increase in the sealing pressure will cause an increase in the constricting pressure applied to the flange of the cap, which will sometimes be sufficient to pinch off the top of the bottle.

It is the object of the present invention to overcome these difficulties, and I accomplish this purpose by the method hereinafter described, wherein the seating of the cap and its contained sealing medium upon the lip of the bottle is attained by means of force applied to the flange of the cap, and acting in a direction substantially lengthwise of the bottle. The degree of force so applied is preferably measured by the resisting power of the metal of the cap-flange, and can thus be made a constant quantity, sufficient to accomplish a tight seal upon the lip of the bottle, while the application of destructive excess pressure is prevented. When the metal of the cap-flange yields to the applied force, it is preferably caused to engage in locking contact with the usual exterior bead or projection on the bottle-mouth.

In the practice of my invention I have also found that effective sealing can be accomplished with sealing disks and caps of less weight than have heretofore been employed.

While the method which forms the subject-matter of the present application is not limited in respect of mechanism or appliances which may be employed in its practice, it will be described as carried out by the use of mechanism also invented by me, and which forms the subject-matter of an application for Letters Patent filed by me on October 11th, 1907, Serial No. 396,988, of which this application is a division. It will be noticed that in this machine I have been able to dispense with the usual seal-compressing "plunger" and all compensating devices, as unnecessary in the practice of my method. The machine has thus been materially simplified, while it is at the same time enabled to act positively and with uniformity in each sealing operation, and with uniform results.

In the accompanying drawings forming a part of this specification Figure 1 is an elevation of the said machine; Figs. 2 and 3 are sectional views on an enlarged scale of the



parts of the machine directly operative upon the cap, showing the positions of said parts at the beginning and end of the capping operation respectively; Fig. 4 is a sectional plan on a plane indicated by the line IV—IV, Fig. 2; Fig. 5 is a view similar to Fig. 2 illustrating a modification in the construction of the capping devices; and Fig. 6 is a sectional detail showing means for supporting hand-fed caps in position to receive the bottle-mouth.

While in the practice of my invention either the head carrying the devices operative upon the cap, or the bottle itself, may be moved one relatively to the other, to effect the sealing operation, I have shown mechanism whereby the sealing-head is moved down while the bottle is supported upon a table.

The operating mechanism consists of a power shaft 1 mounted in suitable bearings near the base of a hollow standard 2. The shaft is rotated by suitable means, as the pulley 2<sup>a</sup> loosely mounted on the shaft, but adapted to engage the latter through a clutch mechanism 3, which is operated by a treadle 4. On the shaft is secured an eccentric 5 surrounded by a strap 6, which is connected to the rod 7 passing up through the standard 2, and having the head 8 secured to its upper end. The bottle to be capped is supported upon a table 9, carried by the sleeve 10 surrounding the standard 2, and adapted to be secured thereon at different points dependent on the height of the bottle operated on.

It will be readily understood by those skilled in the art, that other forms of mechanism than that shown and described can be employed to shift the sealing-head of the bottle-supporting table.

The head 8 is formed in part by shell 11, having an enlarged lower portion for the reception of the radially slotted annular block 12, which is held in position by the annular plug 13, removably secured to the shell 11. The inner walls of the plug are made flaring so as to serve as a guide for the bottle. Struts or fingers 14 are so pivotally supported in the slots in the block 12, which has an internal diameter somewhat greater than the greatest diameter of the cap, that the portion of said struts designed to engage the cap will be in a plane below the plane of the pivotal points of the struts, and will lie in a circle having a diameter intermediate of the greatest and least external diameters of the cap. These struts are held from outward radial movement, so that when their inner ends are shifted relatively to their pivotal points, by engagement with the flange of the cap, such ends will move in towards a common center, until they bear against the side walls of the cap as hereinafter described. These struts are preferably V-shaped, and

are pivotally supported at or adjacent to their apices. In the construction shown their apices project between rings 15 arranged in grooves formed in the outer periphery of the block 12, said rings being split as indicated at 30, Fig. 4, to permit of their easy insertion into the grooves. While the normal position of the struts may be determined by any suitably arranged stop, against which the struts will move after a cap has been secured on a bottle, it is preferred to control the return movements of the struts by means of a sleeve 16 freely movable in the shell 11, and provided at its lower end with a flange 17 adapted to project between the legs of the struts. This sleeve normally rests on a shoulder 18 formed on the inner wall of the block 12, and when in this position the upper legs of the struts will rest on the flange 17, and thereby hold the struts in proper operative positions. This construction whereby the struts are held in proper normal position is preferred, as it will perform another very important function, *i. e.* insure the simultaneous movement or operation of all the struts.

It has been found in practice, that at times the flange or portion of the cap with which the struts engage, will break down at one or more places in advance of other portions, and when this occurs, the cap can move towards the side first broken down, and thereby shift the flange on the opposite side either entirely from under the struts or to such extent as to prevent the cap being locked upon the bottle at that point. Hence suitable means are employed to prevent any independent movement of any of the struts.

The sleeve 16 having the flange 17 engaging as it does the struts 14, will thus perform the triple function of insuring the simultaneous and equal movement of all the struts, insure the return of the struts to normal position, and hold them there. When the inner ends of the struts are moved by engagement with the cap, the sleeve 16 will rest on the lower legs and by its weight will cause the struts to return to normal or operative position, after the cap has been secured on the bottle.

The cap which I employ is provided with an outwardly flaring flange *a*, preferably, as shown, at approximately right angles to the axis of the cap.

For the admission of the cap to the head, and supporting it in proper position therein, I provide the passage 19 in the plug 13, terminating in the ledge 20, Figs. 2 and 3. Or, if desired, the plug 13 may be provided with radial spring latches 21, as shown in Fig. 6.

In operation, a cap being suitably supported in the head, and a bottle having been placed on the table 9, the head 8 is moved down, the cap and neck of the bottle passing through the plug 13. As the struts are so



constructed and arranged, as herein stated, that the portions operating on the cap, i. e. the corners *x*, which are preferably rounded, are in a circle of a diameter intermediate of the least and greatest diameter of the cap. the corners *x* will in the downward movement of the head bear upon the flange *a*. As the head continues to move down and the cap contacts with the bottle the struts will be shifted upwardly, causing their inner ends to move in until the portions *y* thereof bear against the side wall of the cap above the flange. As the struts are then locked as against any further upward movement, the continued downward movement of the head will draw the cap down over the end of the bottle-neck, forcing the sealing disk *b* firmly against the lip of the bottle. The downward pull on the cap is continued with constantly increasing force, until the flange *a* is broken down. In the breaking down of the flange, the corner *c* at the junction of the side wall and flange of the cap, is forced inward under the bead or shoulder *d* of the bottle. The sliding down of the walls *y* of the struts will wipe the flange *a* down towards, but not against, the neck of the bottle below the bead, as no part of the struts pass in under the bead, or approach any nearer the bottle than at the instant of the breaking down of the flange, so that portions of the cap will always be at sufficient distance from the bottle to permit of its being caught by an uncapping tool. As soon as the flange breaks down, the struts will drop or be forced back to normal position, and will be entirely out of contact with the cap or bottle. In other words, the completion of the act of locking the cap on the bottle prevents the exertion of any further pressure thereon. It will also be noticed that if the head 8 should be lowered over the mouth of the bottle without a cap having been placed in position, no pressure will be exerted upon the bottle. The bottle is not subjected to any pressure or force except such as is incident to and involved in the operation of locking the cap thereto. And since the pressure exerted in seating the sealing disk on the mouth of the bottle is thus made proportional to the resistance presented by the flange to flexure or breaking down, this can be made substantially the same on all bottles capped, irrespective of variations in height of the bottles themselves.

In Fig. 5 is shown a construction, wherein the struts 14, when in normal position, have a pivotal bearing on the shoulder 22 on the plug 13, and an annular weight 24 bears upon the outer ends of the struts. This weight will yieldingly hold the struts in such position as to permit of a cap being pushed into the yielding ring formed by the corners *x* of the struts, where it will be held in position to receive the end of the bottle. Outward

movement of the struts is prevented by a depending flange 25 on the annular weight.

I claim herein as my invention:

1. The method of applying flanged sealing caps to bottles, which consists in exerting force upon the flange of the cap only in a single intermediate peripheral line to seat the body of the cap in final sealing position on the lip of the bottle, and bend the flange of the cap into locking engagement with the bottle.

2. The method of applying flanged sealing caps to bottles, which consists in causing the cap to rest upon the lip of the bottle, gripping the flange of the cap, projecting the bottle and cap against the gripping strain to seat the body of the cap in sealing contact with the lip of the bottle and bend the flange of the cap into locking engagement with the bottle, and continuing the movement of the bottle to release the cap and bottle from further pressure.

3. The method of applying flanged sealing caps to bottles, which consists in gripping the flange of the cap peripherally only, forcing the body of the cap into sealing contact with the lip of the bottle by bodily movement of the gripping means, and bending the flange of the cap into engagement with the bottle by contraction of the gripping means.

4. The method of applying flanged sealing caps to bottles, which consists in gripping the cap peripherally only and by a movement of the gripping means seating the cap in final sealing position on the lip of the bottle and locking the flange in engagement with the bottle.

5. The method of applying sealing caps to bottles, which consists in imparting a movement to the cap and bottle in a direction lengthwise of the bottle, and in such movement locking the cap in sealing engagement with the bottle and releasing the cap from engagement with the seal-applying means.

6. The method of applying sealing caps to bottles, which consists in imparting a movement to the cap and bottle in a direction lengthwise of the bottle and in such movement gripping the cap, locking it in sealing position on the bottle, and releasing the cap from engagement with the gripping means.

7. The method of applying sealing caps to bottles, which consists in peripherally gripping the cap, automatically varying the grip in proportion to the resistance presented by the cap, and by a movement of the gripping means and bottle sealing the cap in final sealing position on the lip of the bottle and locking the flange in engagement with the bottle.

In testimony whereof, I have hereunto set my hand.

SAMUEL C. BOND.

Witnesses:

ARTHUR H. G. GARRETT,  
THEO. W. TRIGGS.